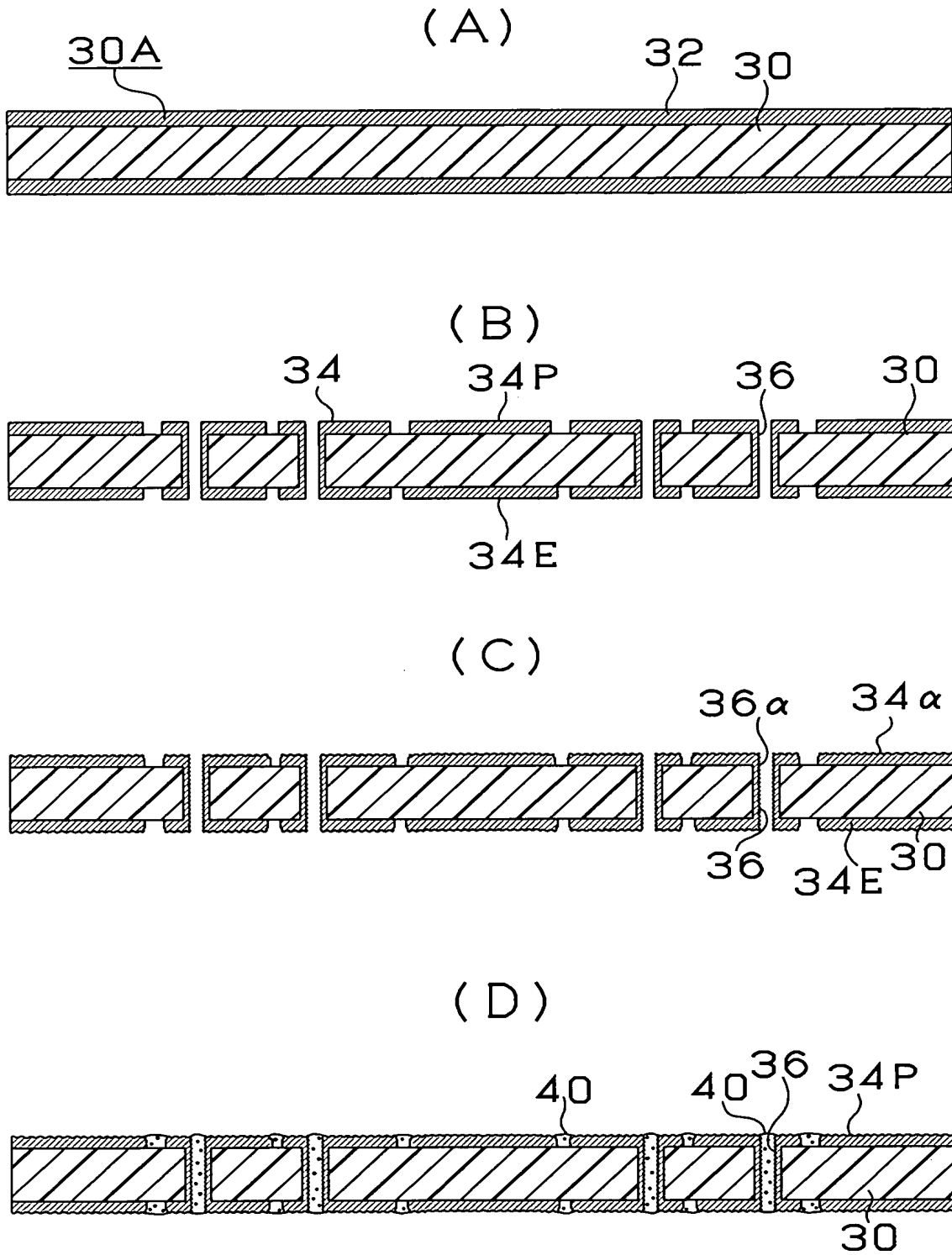


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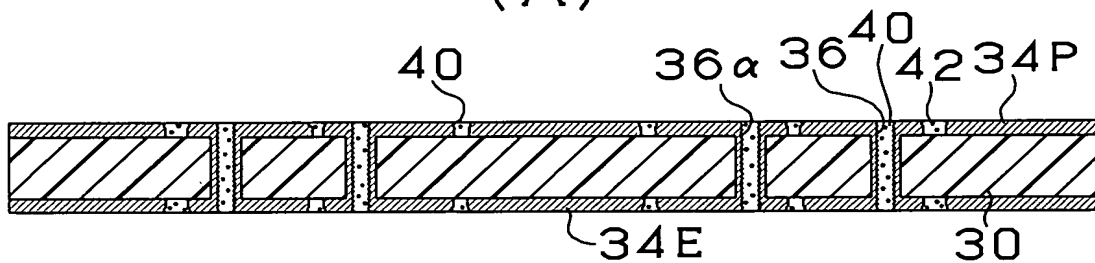
Fig. 1



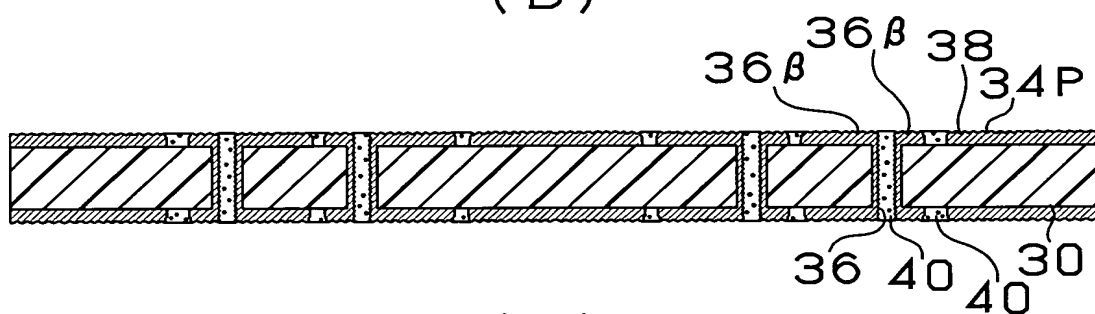
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Fig. 2

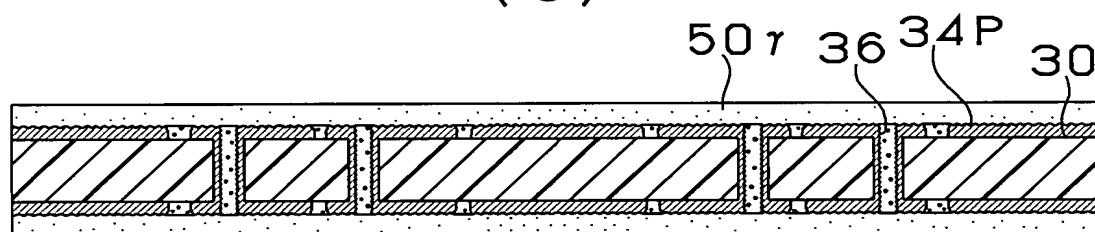
(A)



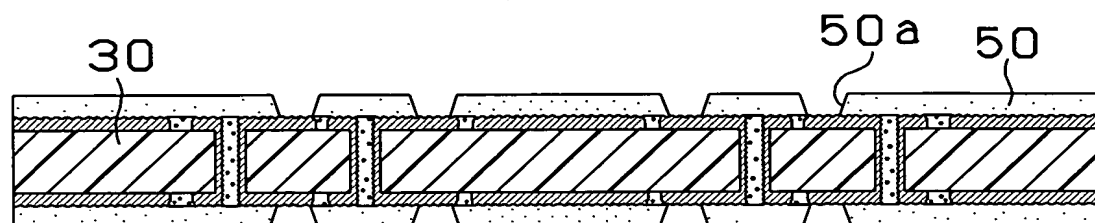
(B)



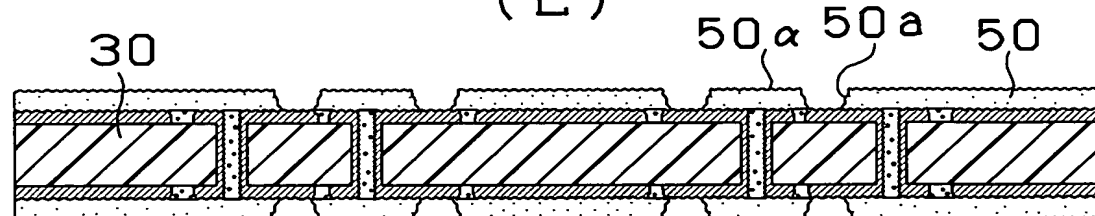
(C)



(D)

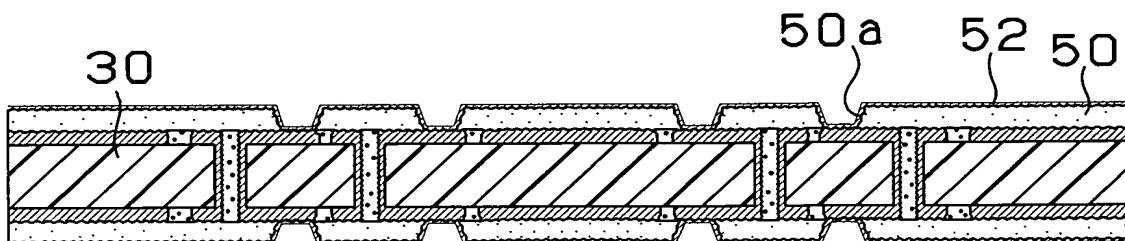


(E)

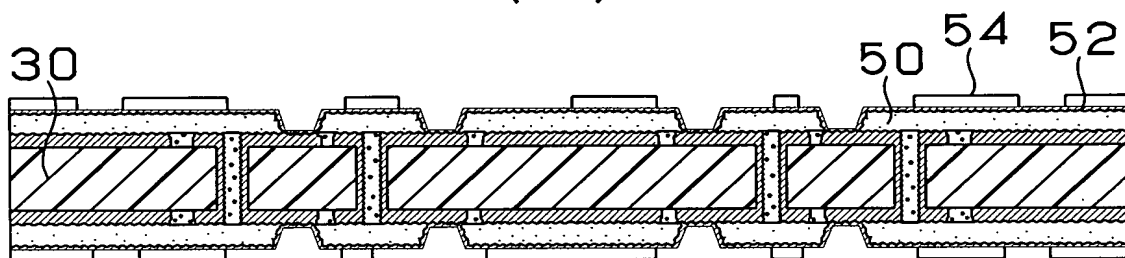


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Fig. 3

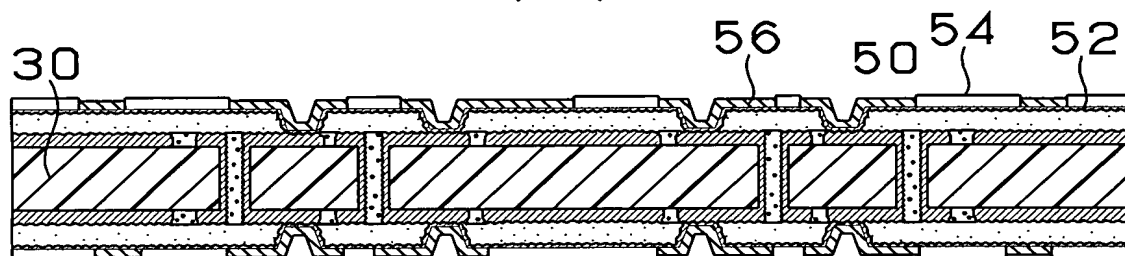
(A)



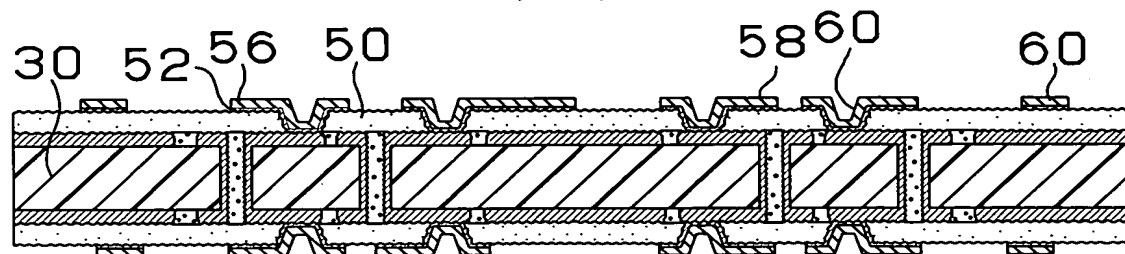
(B)



(C)



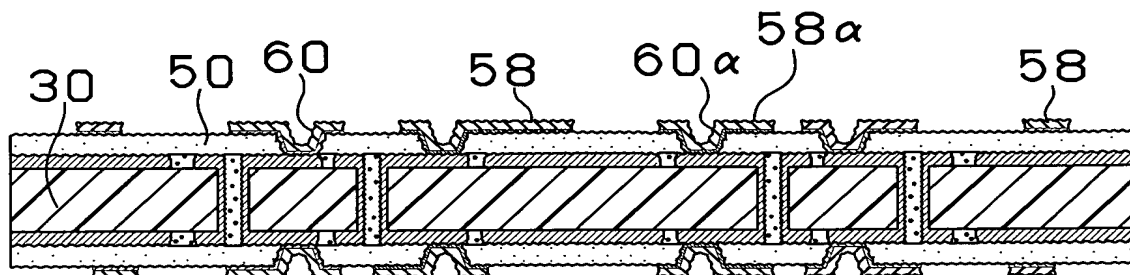
(D)



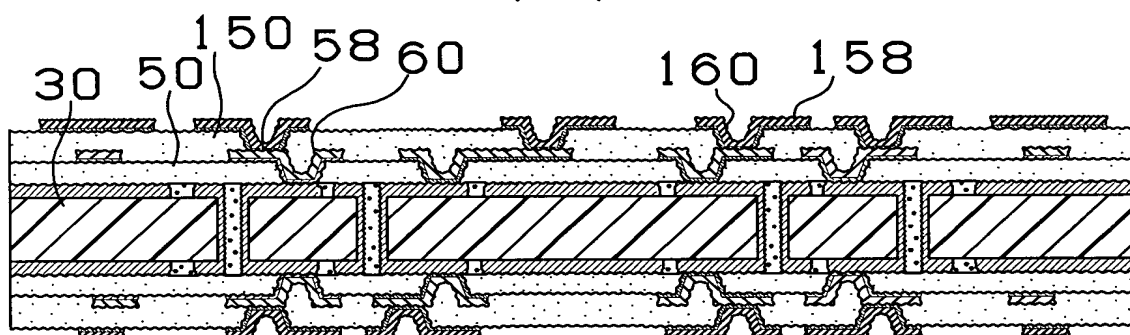
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Fig. 4

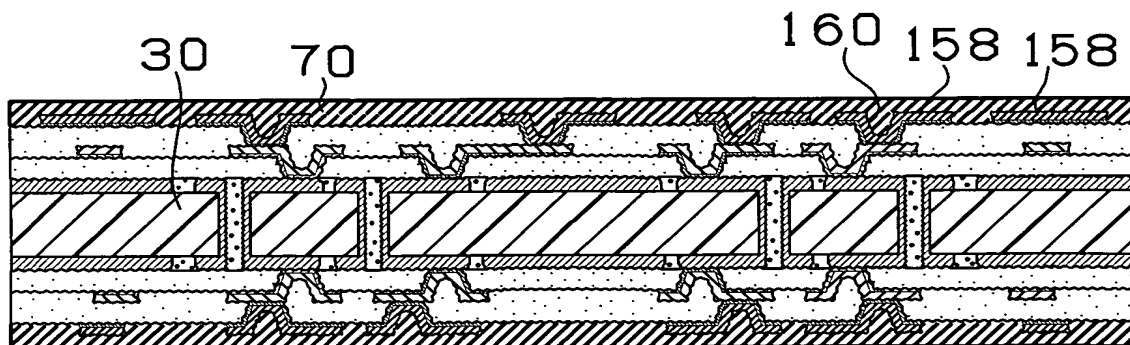
(A)



(B)



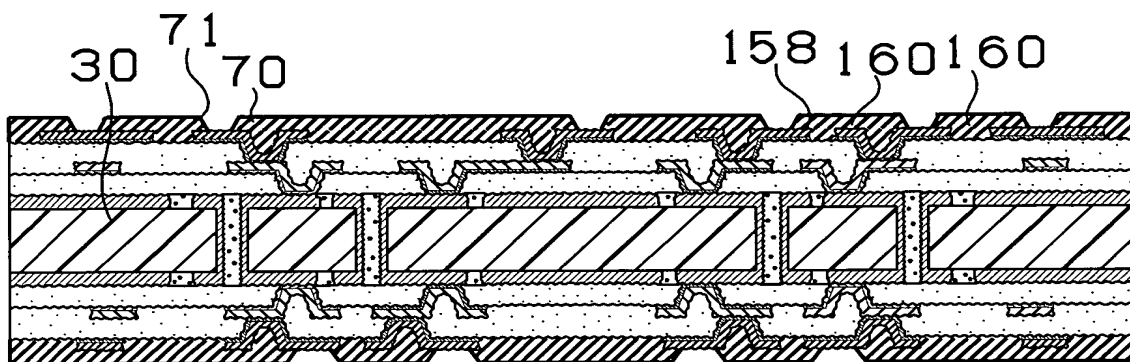
(C)



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Fig. 5

(A)



(B)

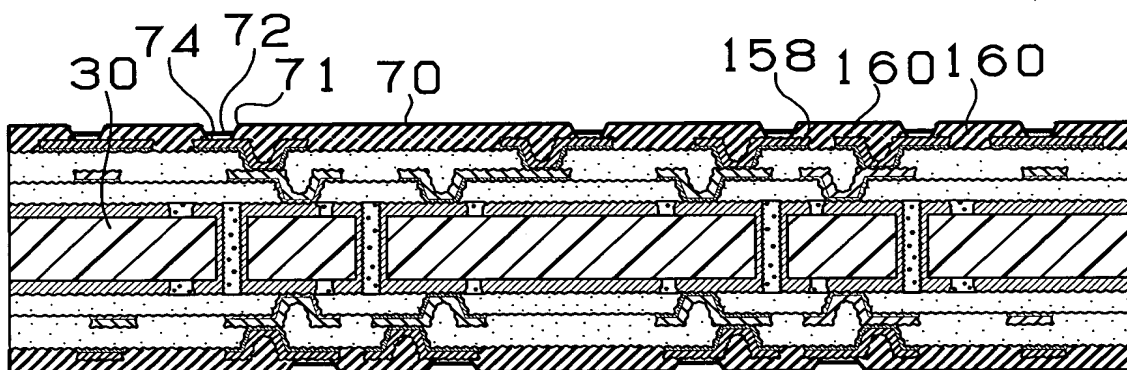


Fig. 6

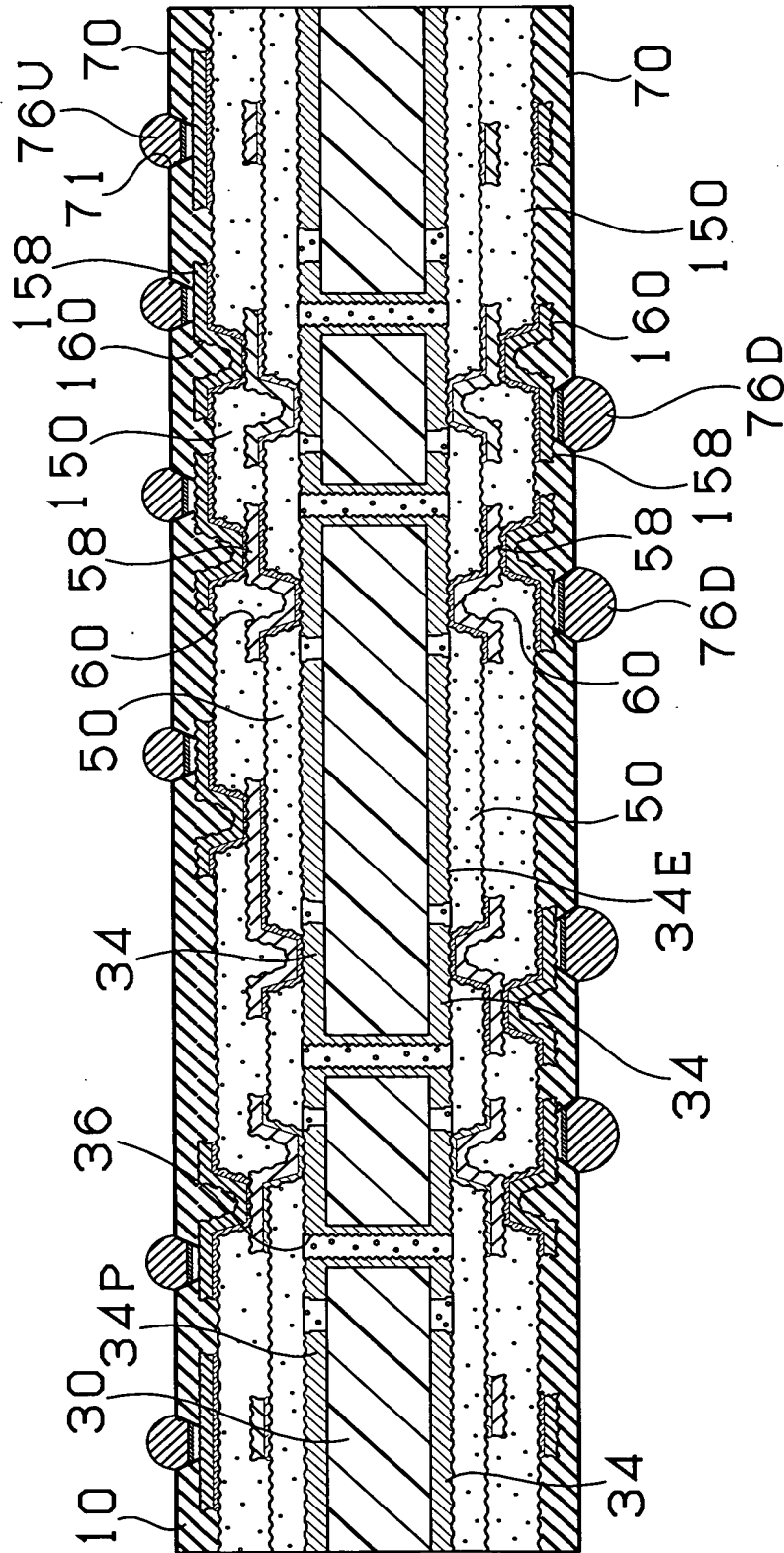


Fig. 7

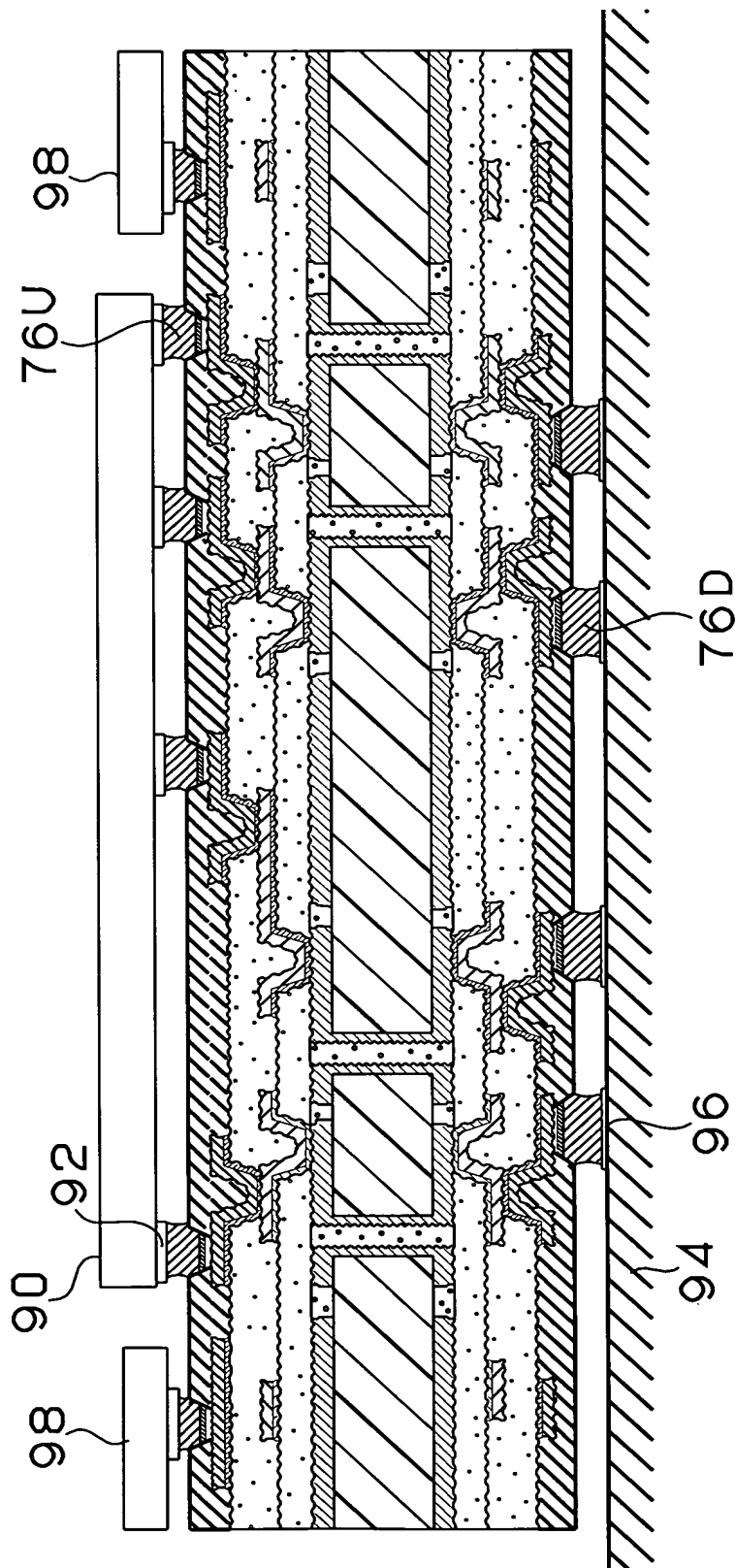


Fig. 9

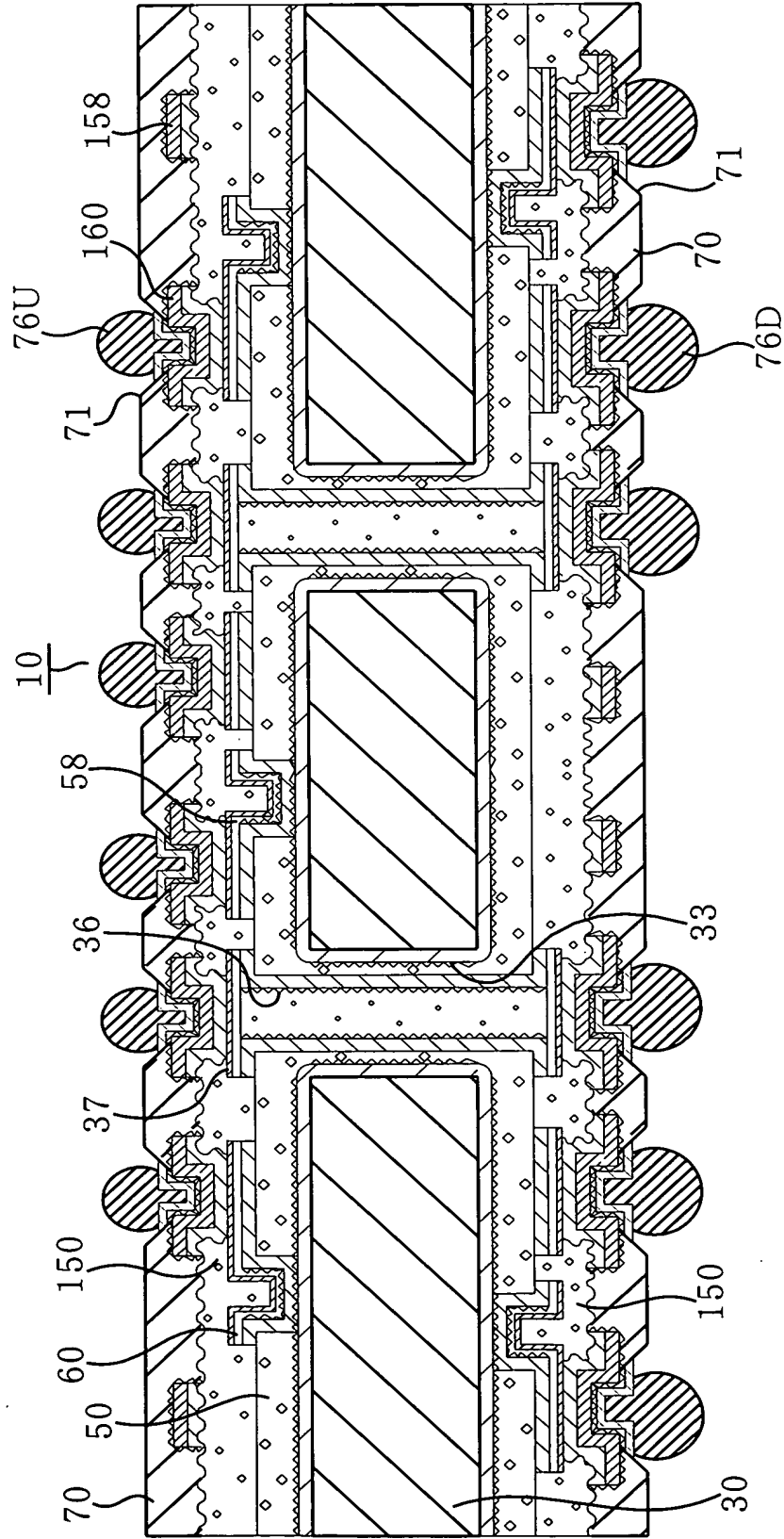
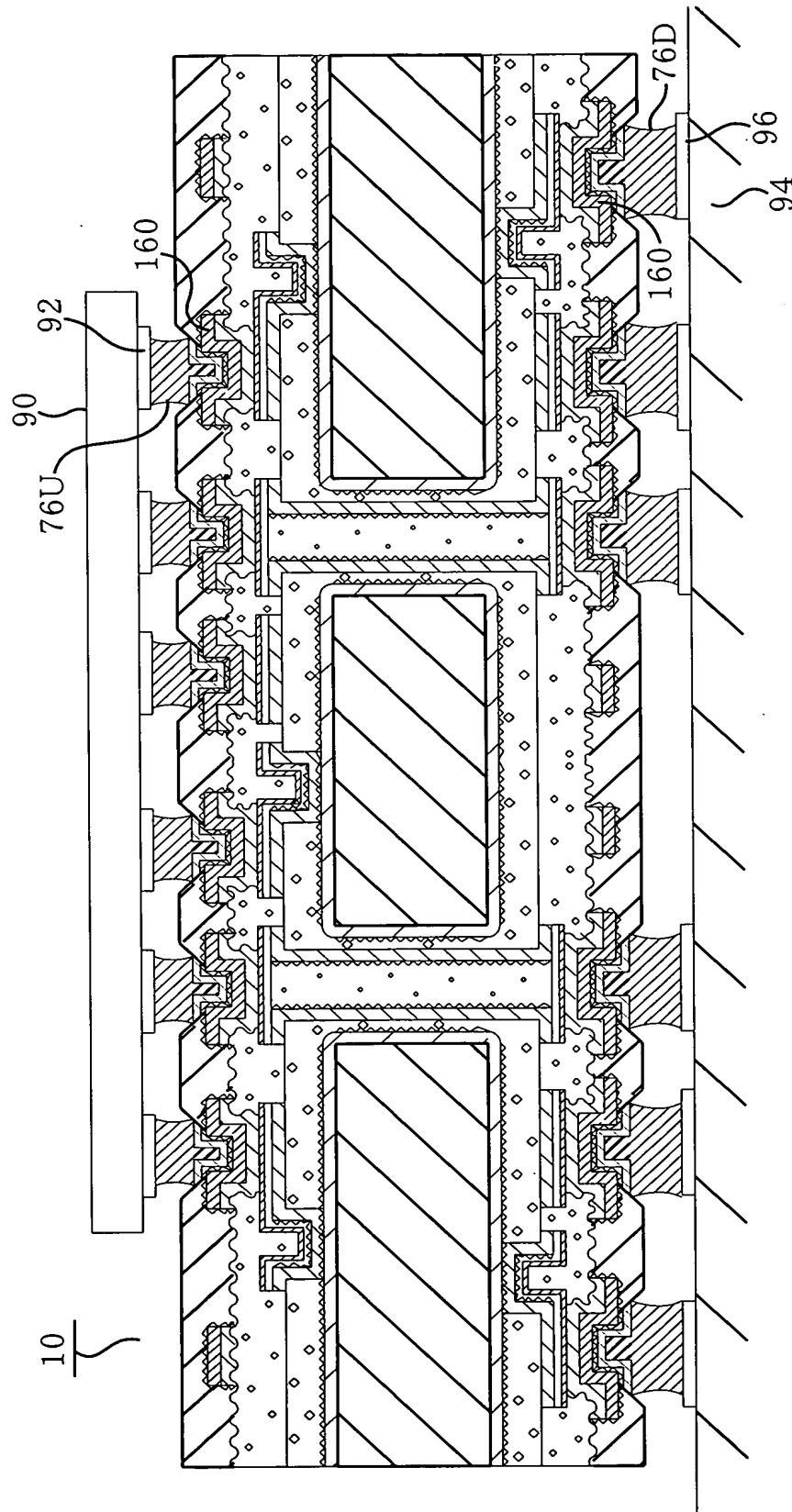


Fig. 10



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Fig. 12

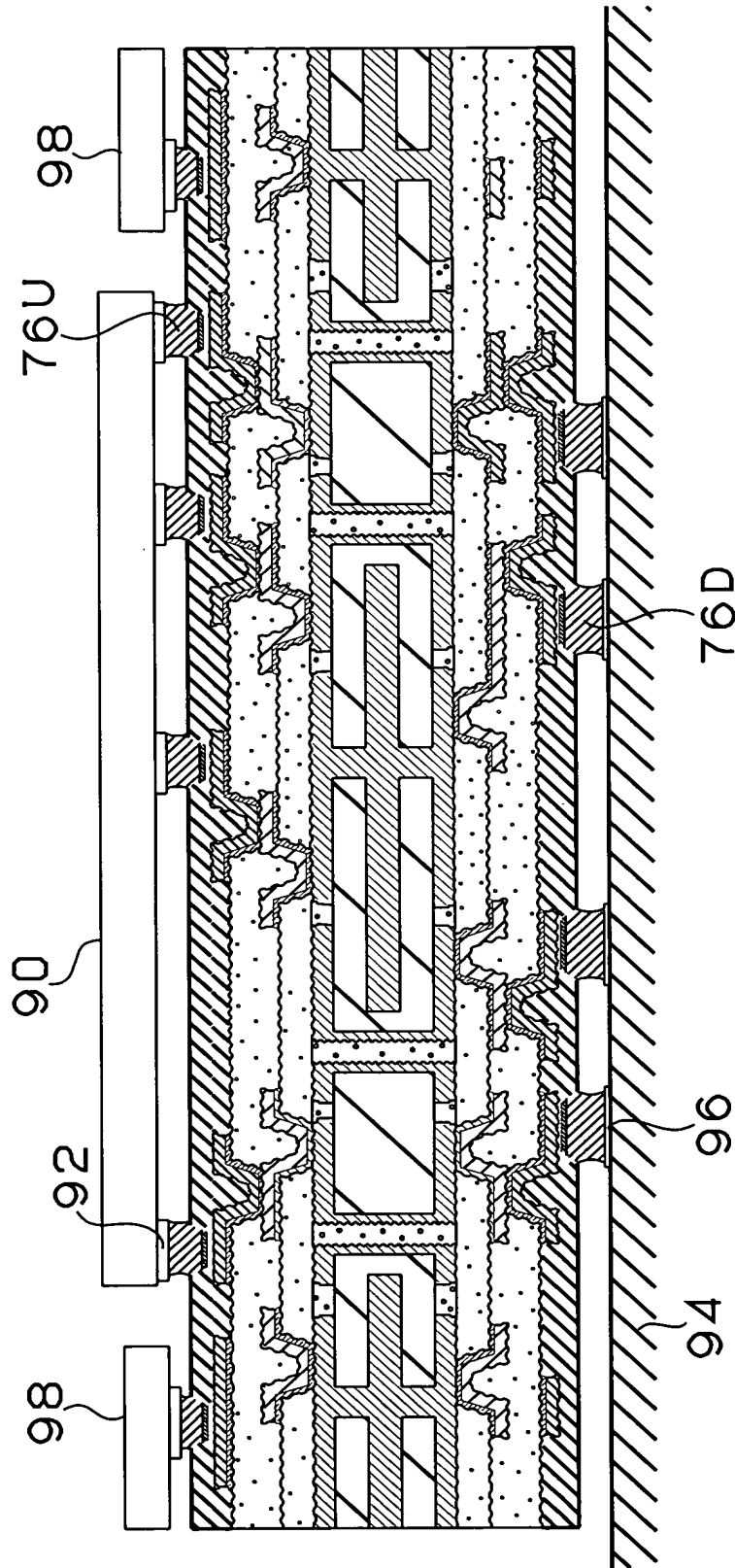


Fig. 13

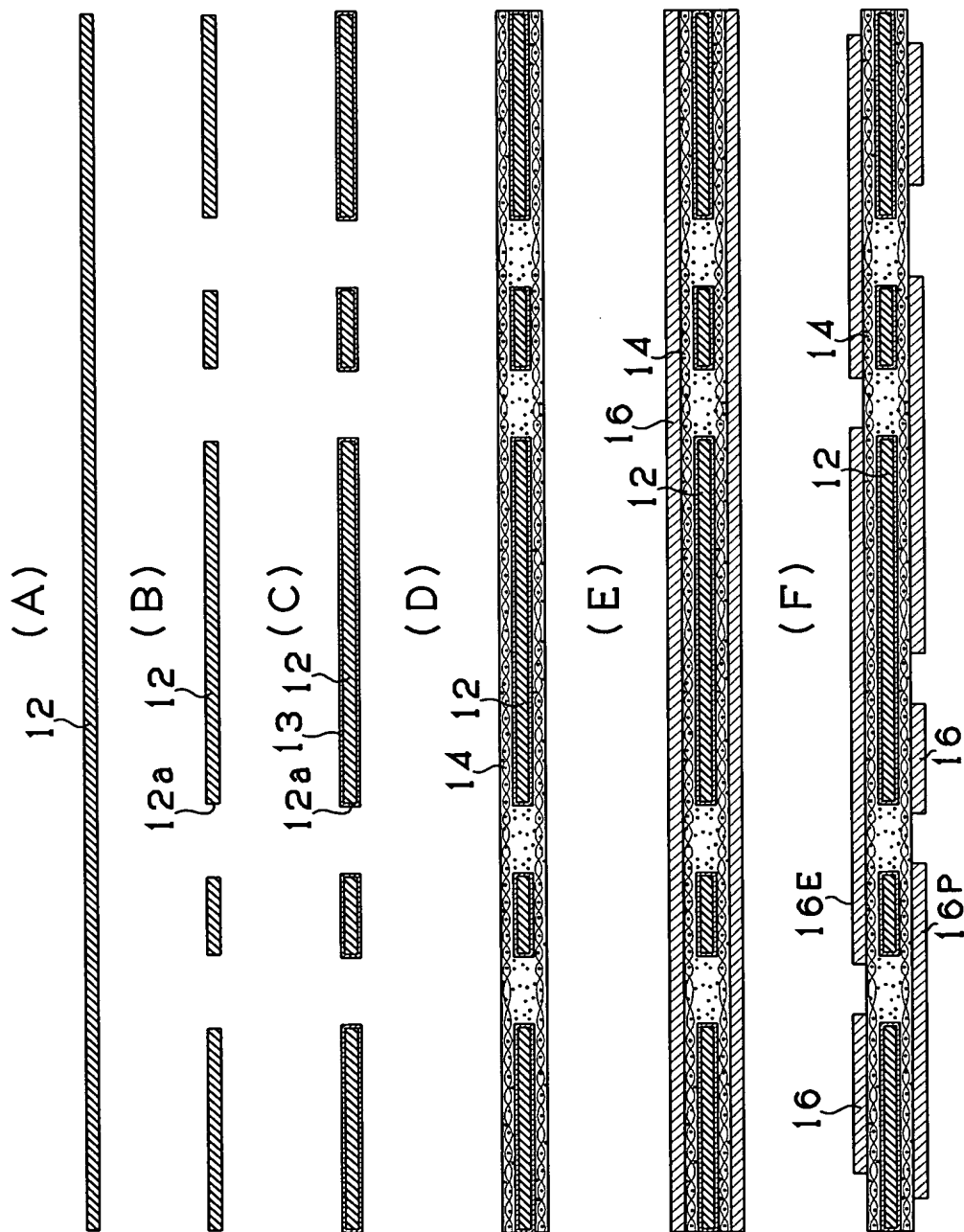
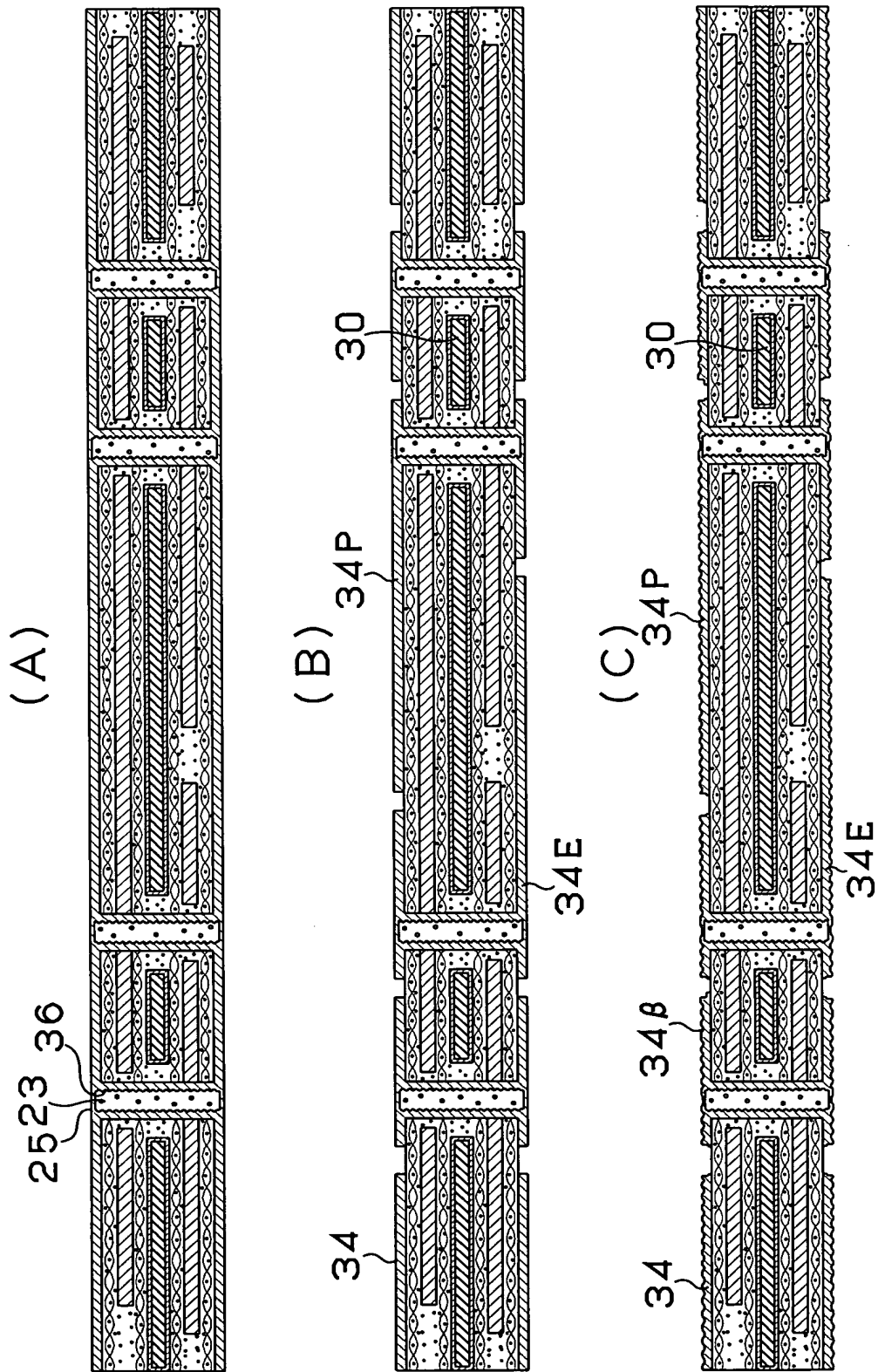


Figure 1 shows five cross-sectional views of a semiconductor device, labeled (A) through (E). The device consists of a substrate 16 with a patterned layer 18 on top. In view (A), the layer 18 is a continuous film. In view (B), the layer 18 is patterned into rectangular islands 16P. In view (C), the layer 18 is patterned into rectangular islands 18, and a new layer 34α is formed on top of the substrate 16. In view (D), the layer 34α is patterned into rectangular islands 34α, and a new layer 36 is formed on top of the substrate 16. In view (E), the layer 36 is patterned into rectangular islands 36, and a new layer 22 is formed on top of the substrate 16. The layers 18, 34α, and 36 are shown with different hatching patterns to distinguish them.

Fig. 15



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Fig. 16

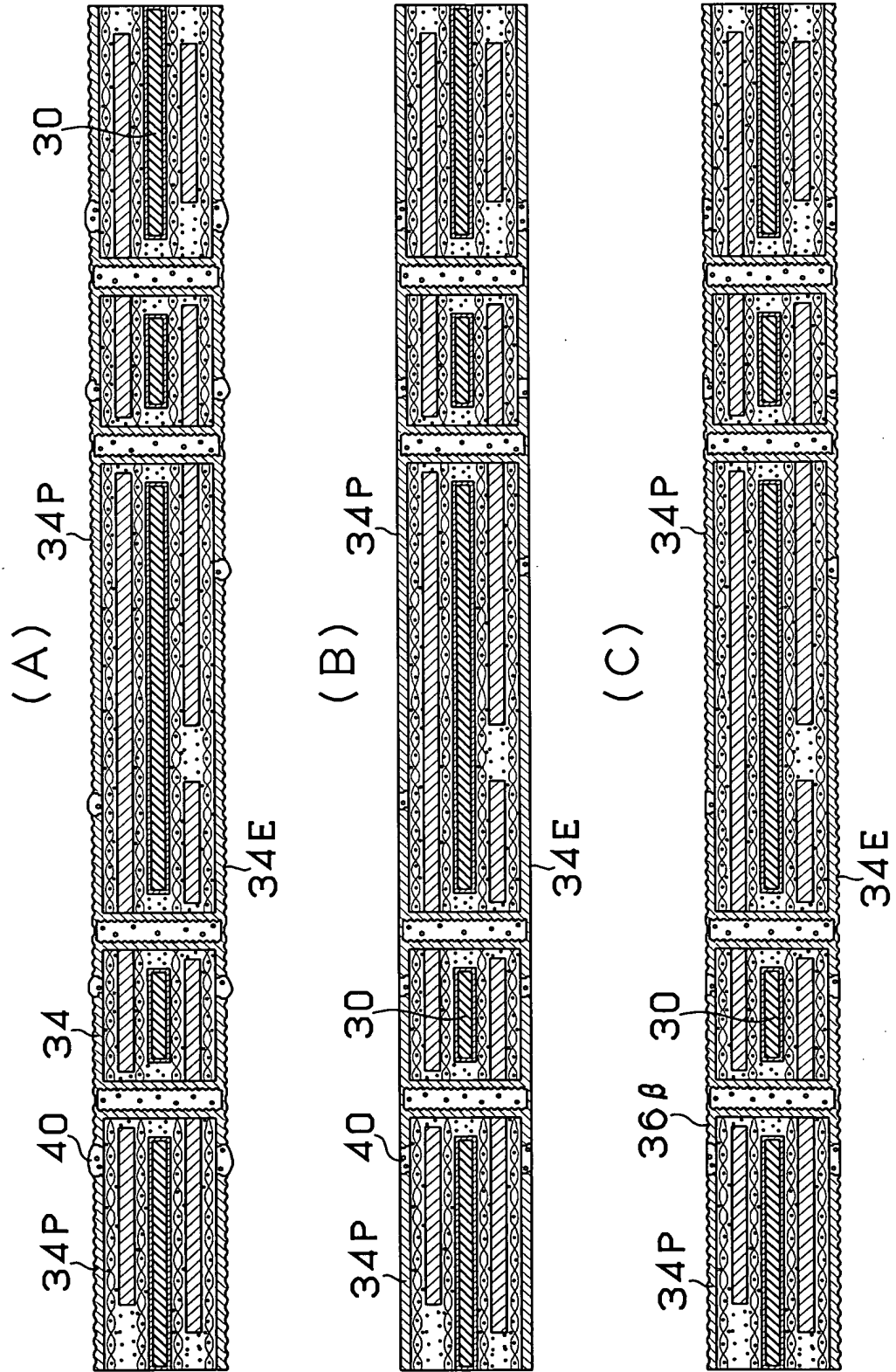


Fig. 17

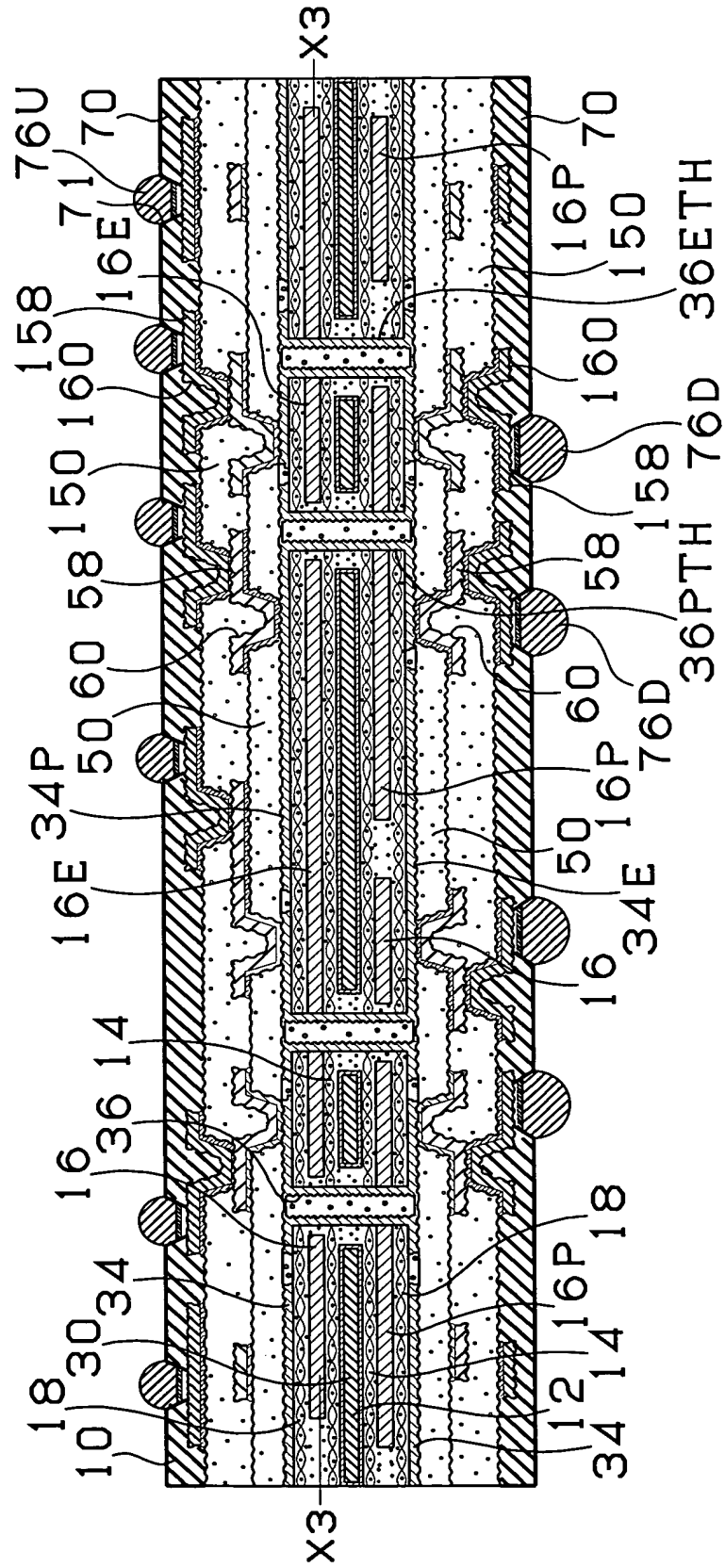


Fig. 18

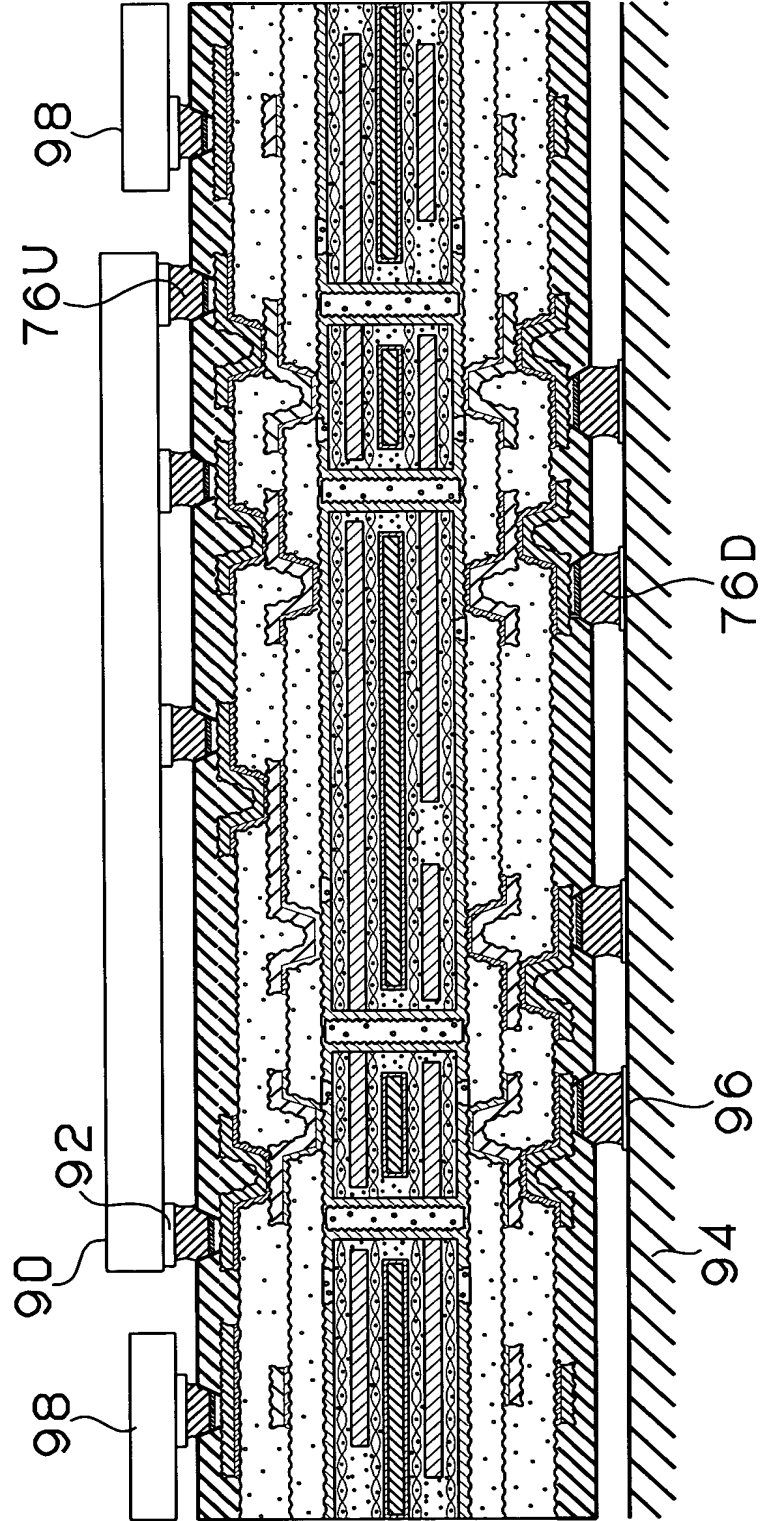


Fig. 19

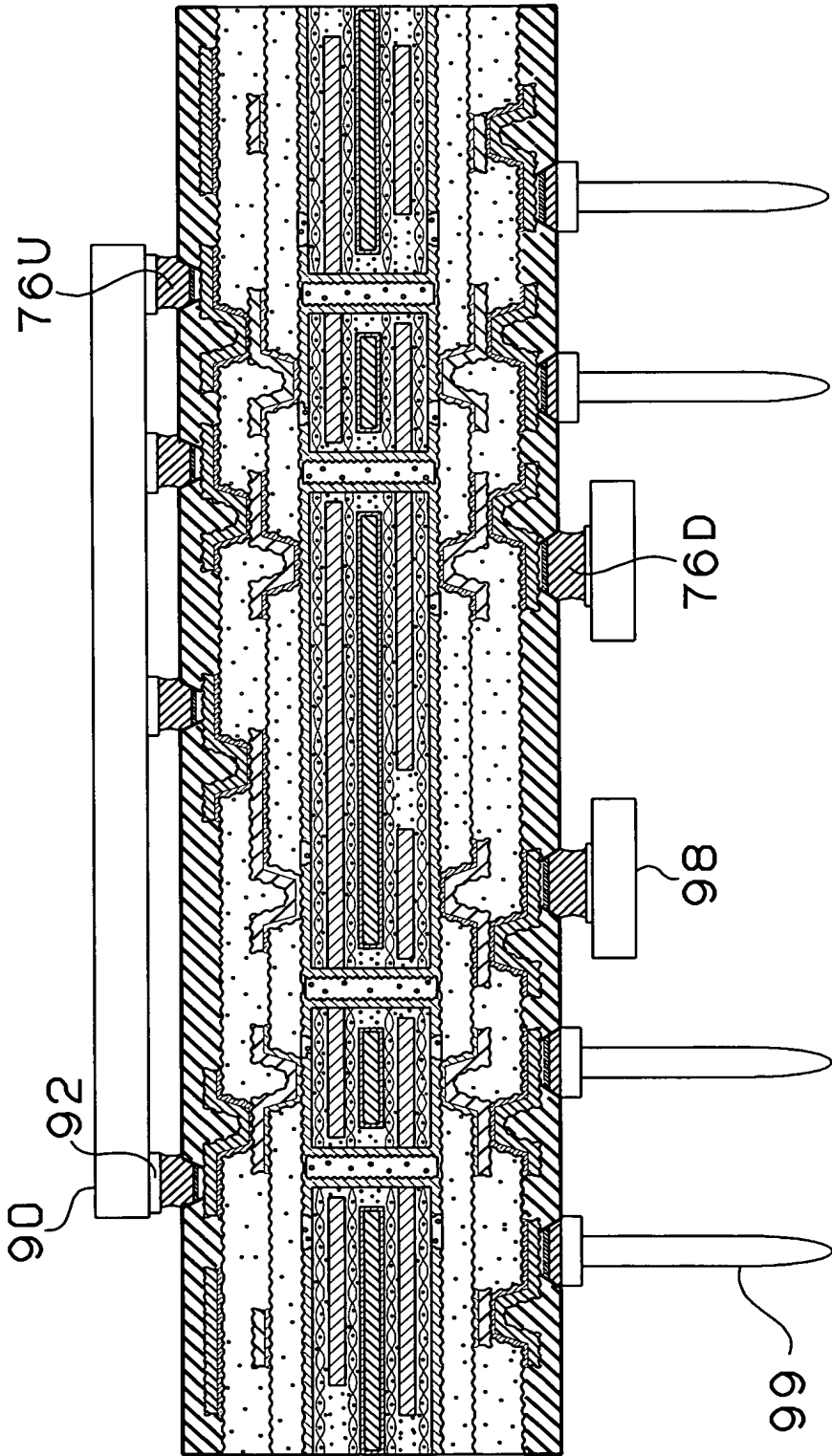


Fig. 20

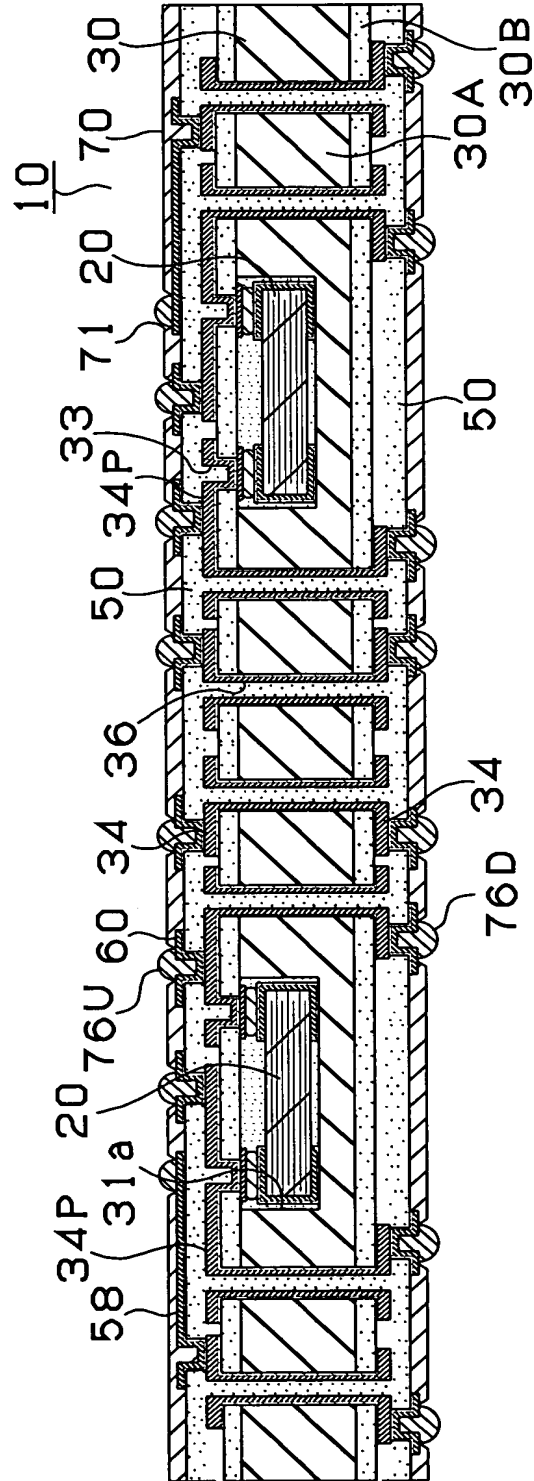


Fig. 21

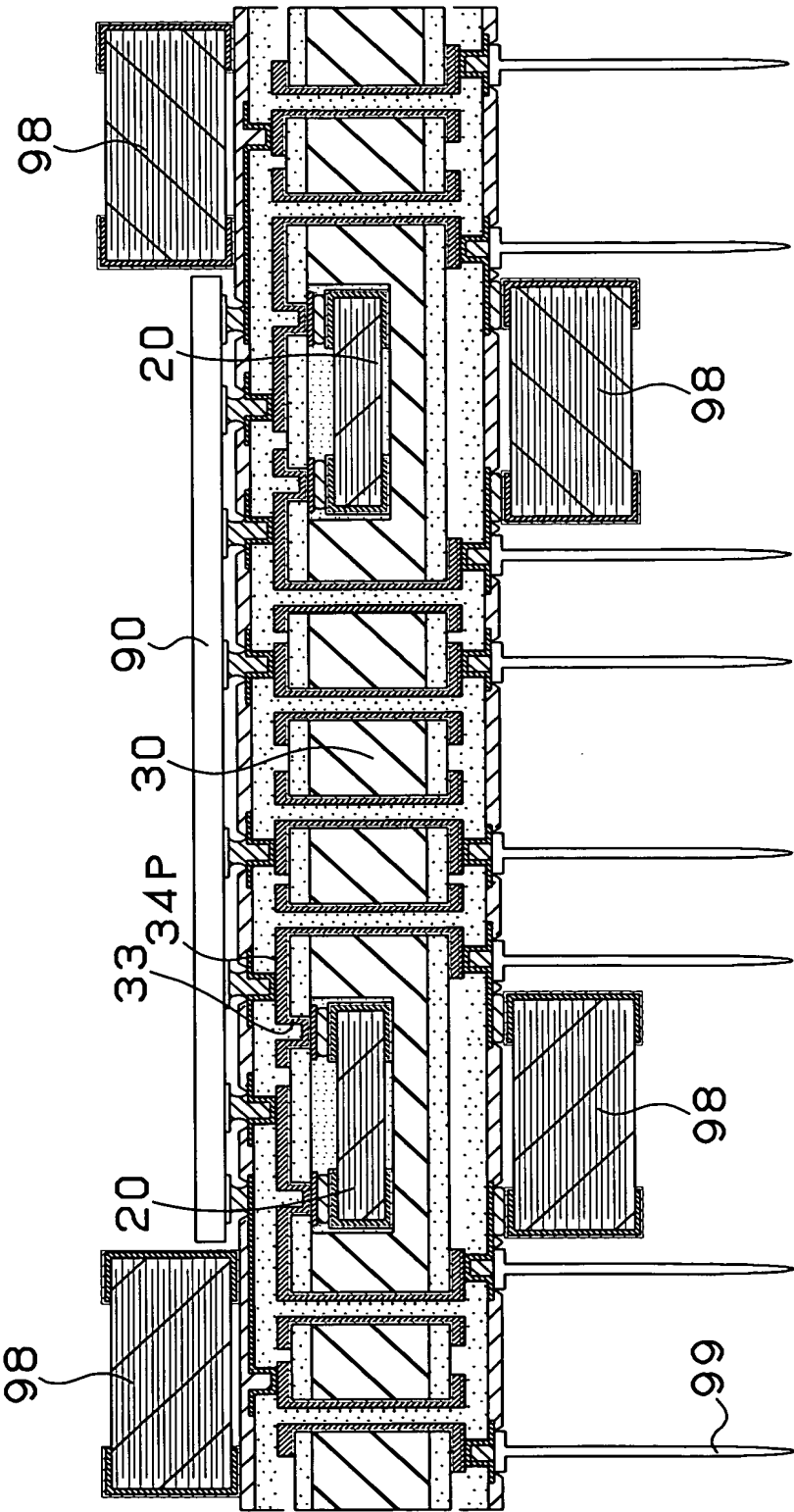
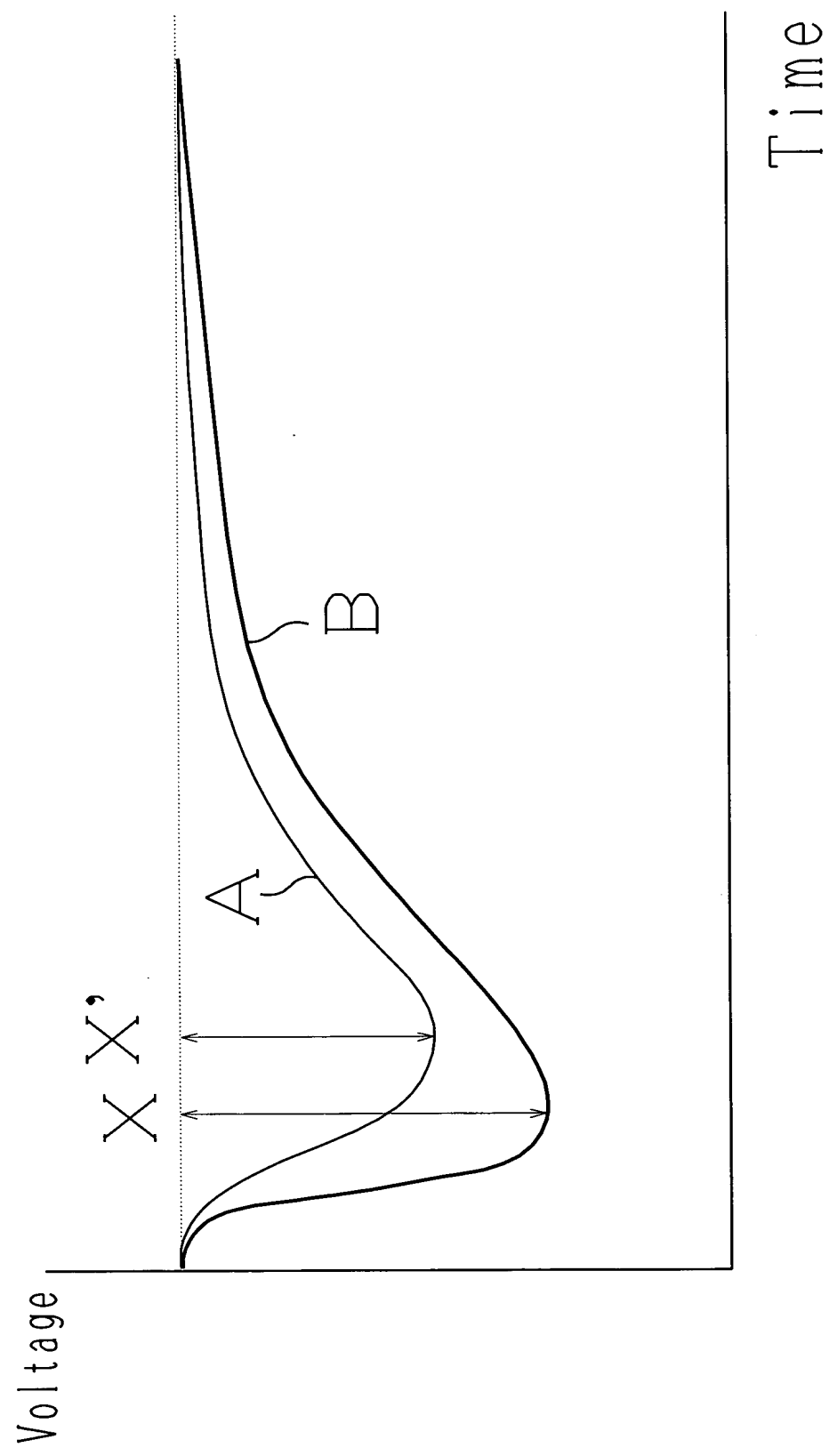
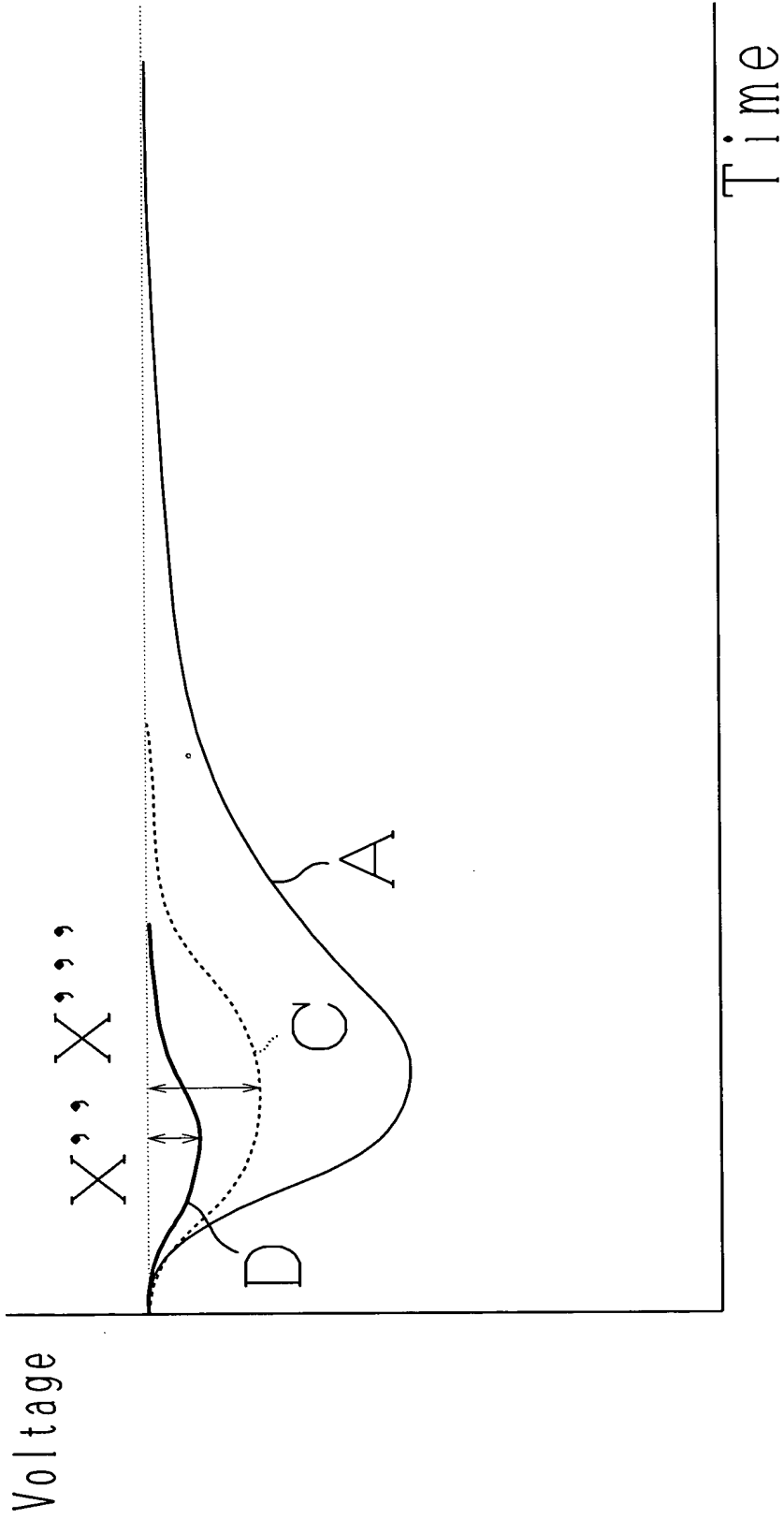


Fig. 22



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Fig. 23



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Fig. 24

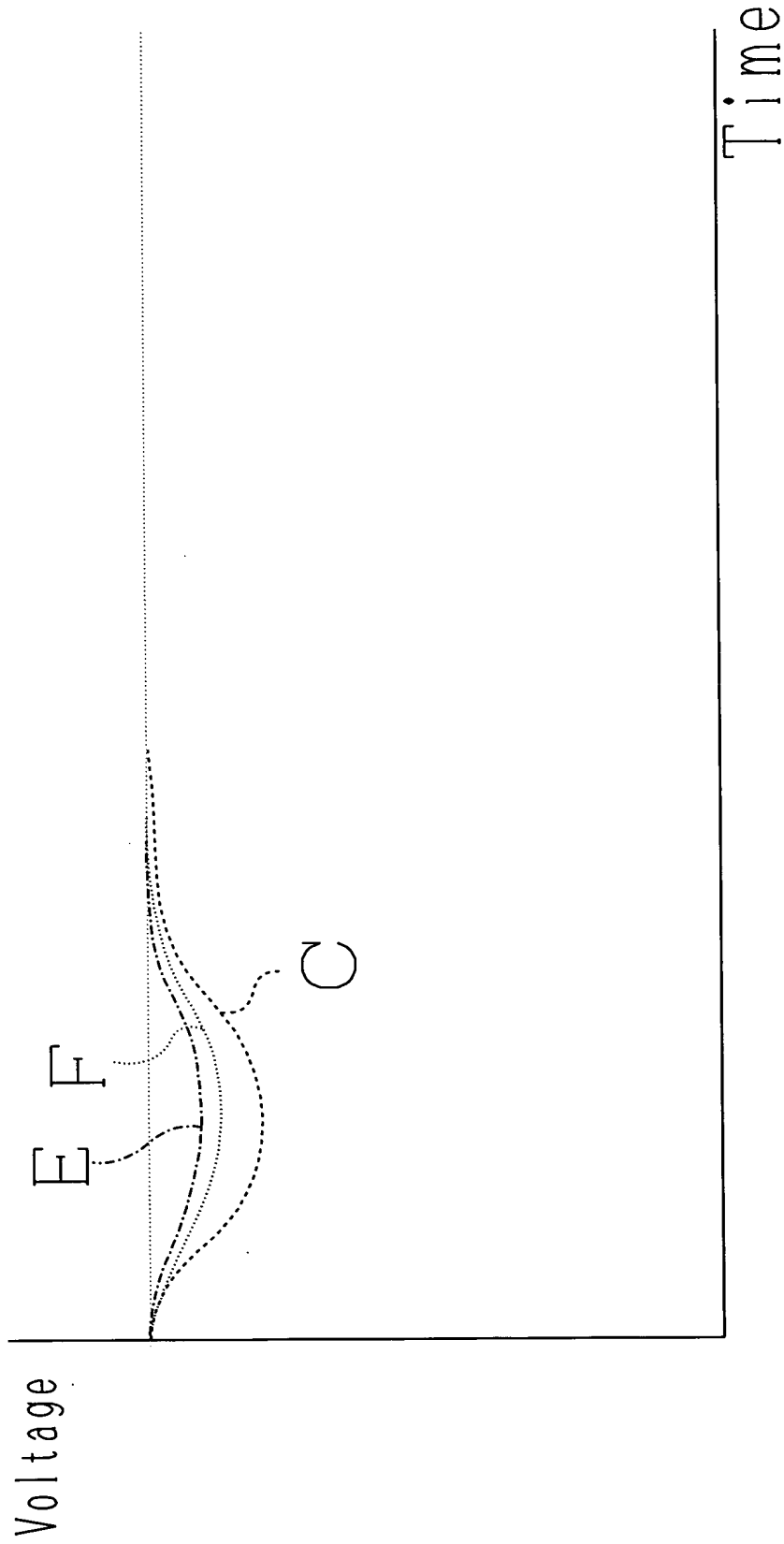
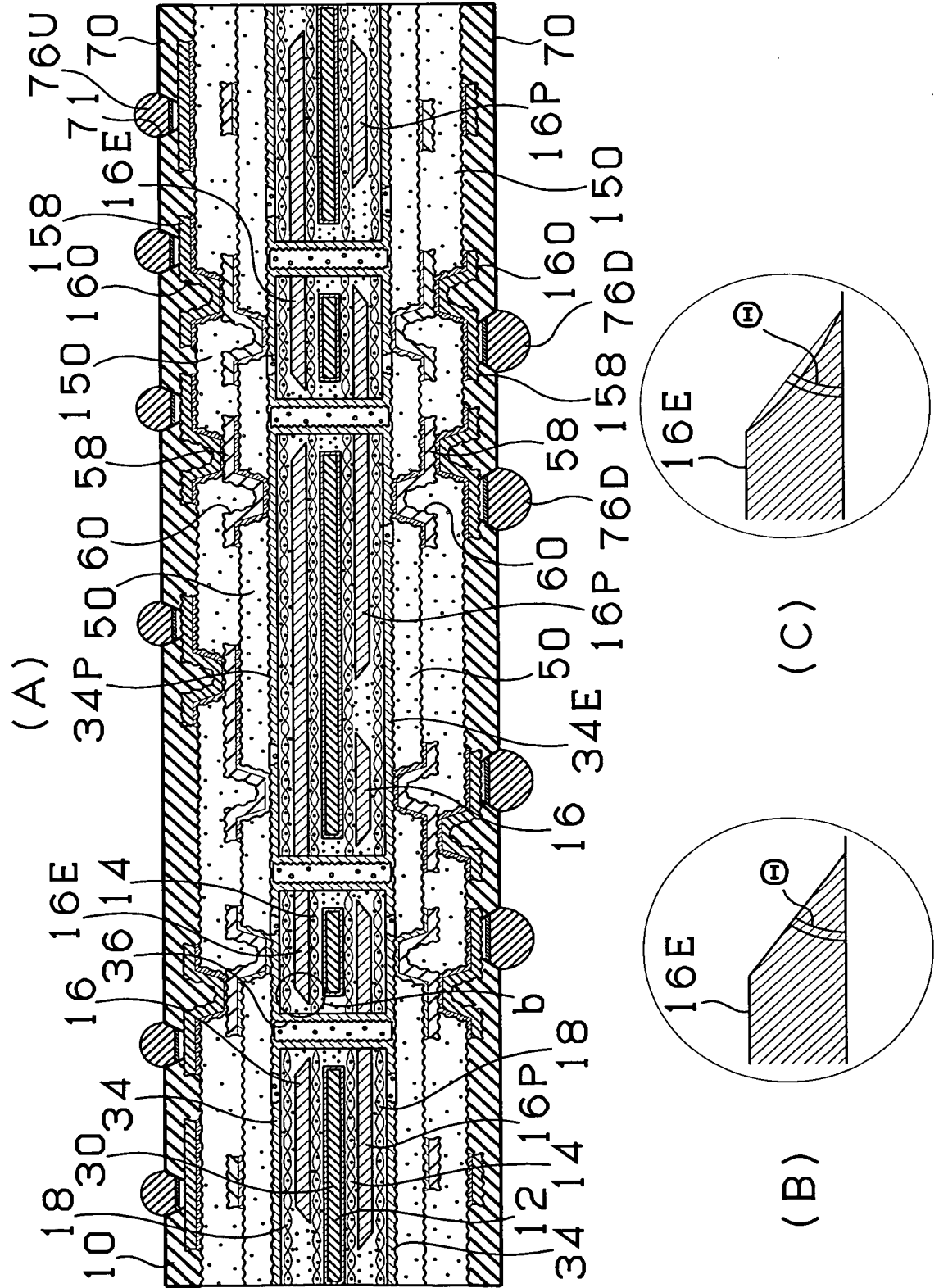


Fig. 26

	Thickness Of Conductor Circuit	100 hr		300 hr		500 hr		1000 hr		Amount Of Voltage Drop
		Presence /Absence Of IC Malfunction	Open Yes/No	Presence /Absence Of IC Malfunction	Open Yes/No	Presence /Absence Of IC Malfunction	Open Yes/No	Presence /Absence Of IC Malfunction	Open Yes/No	
Fifth Embodiment -1	6.7	O	O	O	O	O	O	O	O	0.084
Fifth Embodiment -2	5.3	O	O	O	O	O	O	O	O	0.085
Fifth Embodiment -3	10.0	O	O	O	O	O	O	O	O	0.090
Fifth Embodiment -4	20.0	O	O	O	O	O	O	O	O	0.094
Fifth Embodiment 5	30.0	O	O	O	O	O	O	O	O	0.095
Fifth Embodiment -6	40.0	O	O	O	O	O	O	O	O	0.097
Sixth Embodiment -1	2.0	O	O	O	O	O	O	O	O	0.091
Sixth Embodiment -2	3.7	O	O	O	O	O	O	O	O	0.085
Sixth Embodiment -3	5.0	O	O	O	O	O	O	O	O	0.085
Sixth Embodiment 4	30.0	O	O	O	O	O	O	O	O	0.095
Comparison Example -1	1.0	x	O	x	O	x	x	x	x	0.108
Comparison Example-2	1.0	x	O	x	O	x	x	x	x	0.108
Comparison Example-3	1.0	x	O	x	O	x	x	x	x	0.108
Comparison Example-4	1.0	x	O	x	O	x	x	x	x	0.108
Comparison Example-5	1.0	x	O	x	O	x	x	x	x	0.108
Reference Example-1	41.5	x	O	x	O	x	O	x	x	0.103
Reference Example-2	41.5	x	O	x	O	x	O	x	x	0.103
Reference Example-3	41.5	x	O	x	O	x	O	x	x	0.103
Reference Example-4	41.5	x	O	x	O	x	O	x	x	0.103
Reference Example-5	41.5	x	O	x	O	x	O	x	x	0.103

Presence/Absence Of Malfunction Of IC Chip (O: No Malfunction, X: Malfunction) Open Yes/No (O: no open, X: open)

Fig. 27



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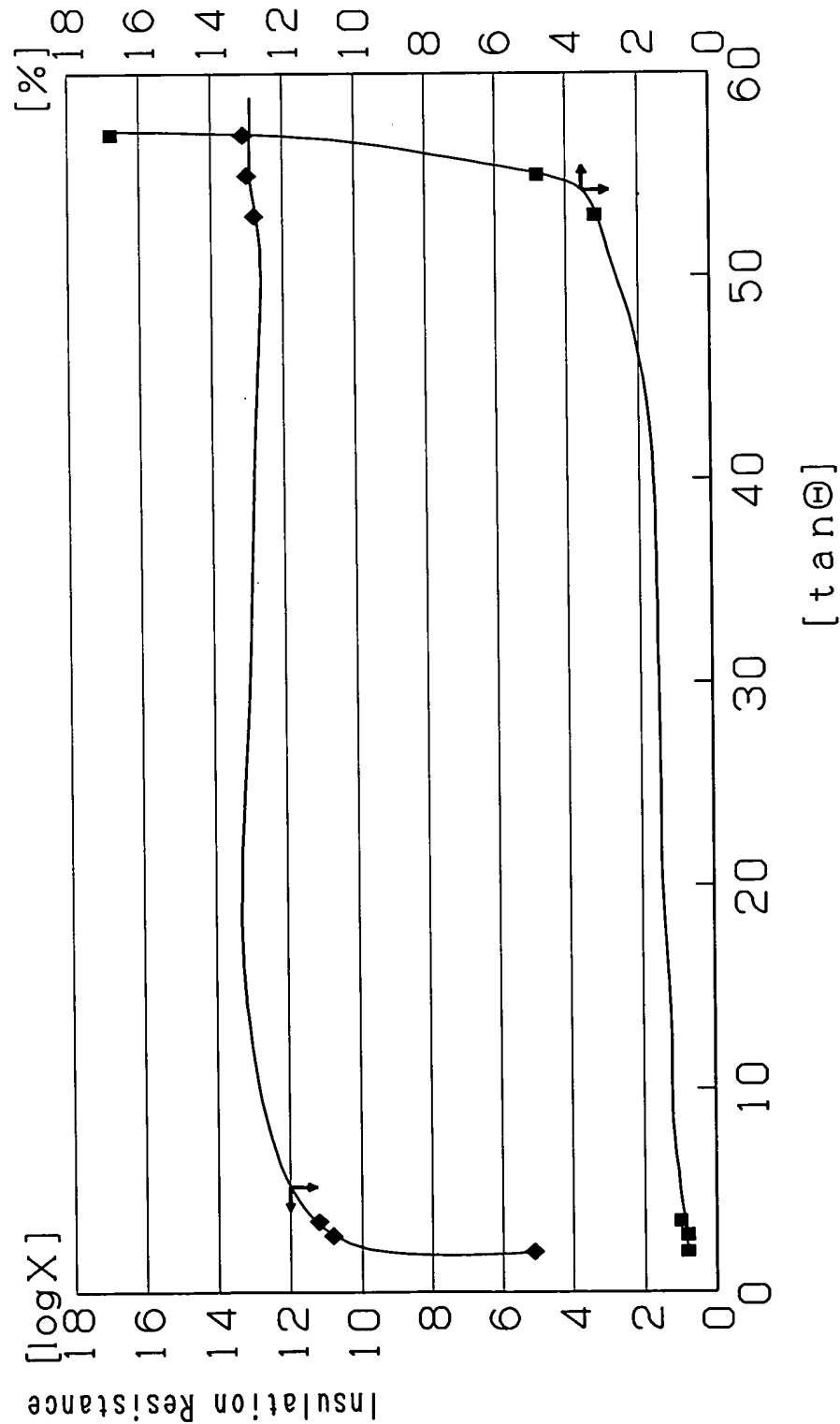
Fig. 28

#	$\tan \theta$	HAST(log X)	Resistance Change Ratio (%)	Shape
Seventh Embodiment—1	2	5.1	0.8	Rounded Face
Seventh Embodiment—2	2.8	10.8	0.8	Rounded Face
Seventh Embodiment—3	3.5	11.2	1.0	Rounded Face
Seventh Embodiment—4	53	12.8	3.2	Rounded Face
Seventh Embodiment—5	55	13.0	4.8	Rounded Face
Seventh Embodiment—6	57	13.1	16.8	Rounded Face
Seventh Embodiment—7	2.8	—	3.4	Linear
Seventh Embodiment—8	53	—	5.8	Linear
Seventh Embodiment—9	57	—	34.2	Linear

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Resistance Change Ratio

Fig. 29



Embodiment	Thickness Of Conductive Layer In Inner Layer	Shape Of Taper	tan θ	Presence/Absence Of Malfunction				Heat Cycle Test	
				No.1	No.2	No.3	No.4	1000□	2000□
Eighth Embodiment-1	30	Rounded Face	1.6~2.5	No	Yes	Yes	—	—	—
Eighth Embodiment-2	45	Rounded Face	1.4~2.1	No	No	Yes	—	—	—
Eighth Embodiment-3	60	Rounded Face	1.4~2.1	No	No	No	—	—	—
Eighth Embodiment-4	100	Rounded Face	1.3~1.9	No	No	No	—	—	—
Eighth Embodiment-5	125	Rounded Face	1.3~1.9	No	No	No	—	—	—
Eighth Embodiment-6	150	Rounded Face	1.2~1.7	No	No	No	—	—	—
Eighth Embodiment-7	30	Rounded Face	3.0~10.8	No	No	No	Yes	—	—
Eighth Embodiment-8	45	Rounded Face	3.0~11.0	No	No	No	Yes	—	—
Eighth Embodiment-9	60	Rounded Face	3.0~11.2	No	No	No	Yes	—	—
Eighth Embodiment-10	100	Rounded Face	2.8~11.2	No	No	No	Yes	—	—
Eighth Embodiment-11	125	Rounded Face	2.7~11.0	No	No	Yes	Yes	—	—
Eighth Embodiment-12	150	Rounded Face	2.7~11.4	No	No	Yes	Yes	—	—
Eighth Embodiment-13	30	Rounded Face	3.0~5.3	No	No	No	Yes	—	—
Eighth Embodiment-14	45	Rounded Face	3.1~5.4	No	No	No	No	—	—
Eighth Embodiment-15	60	Rounded Face	3.1~5.4	No	No	No	No	—	—
Eighth Embodiment-16	100	Rounded Face	2.7~5.5	No	No	No	No	—	—
Eighth Embodiment-17	125	Rounded Face	2.9~5.7	No	No	No	No	—	—
Eighth Embodiment-18	150	Rounded Face	2.7~5.7	No	No	No	No	—	—
Eighth Embodiment-19	30	Rounded Face	4.2~10.8	No	No	No	Yes	○	○
Eighth Embodiment-20	45	Rounded Face	4.0~11.0	No	No	No	No	○	○
Eighth Embodiment-21	60	Rounded Face	3.8~11.0	No	No	No	No	○	○
Eighth Embodiment-22	100	Rounded Face	3.7~11.2	No	No	No	No	○	○
Eighth Embodiment-23	125	Rounded Face	3.7~11.4	No	No	No	No	○	○
Eighth Embodiment-24	150	Rounded Face	3.7~11.3	No	No	No	No	○	○
Eighth Embodiment-25	30	Linear	4.0~10.8	No	No	No	Yes	○	x
Eighth Embodiment-26	45	Linear	4.0~10.8	No	No	No	Yes	○	x
Eighth Embodiment-27	60	Linear	4.0~11.0	No	No	No	Yes	○	x
Eighth Embodiment-28	100	Linear	3.7~11.2	No	No	No	Yes	○	x
Eighth Embodiment-29	125	Linear	3.8~11.4	No	No	No	Yes	○	x
Eighth Embodiment-30	150	Linear	3.7~11.4	No	No	No	Yes	○	x
Eighth Comparison Example-1	15*	Rounded Face	1.6~2.5	Yes	Yes	Yes	Yes	—	—
Eighth Comparison Example-2	15*	Rounded Face	3.0~10.8	Yes	Yes	Yes	Yes	—	—
Eighth Comparison Example-3	15*	Rounded Face	3.0~5.3	Yes	Yes	Yes	Yes	—	—
Eighth Comparison Example-4	15*	Rounded Face	4.2~10.8	Yes	Yes	Yes	Yes	—	—

A value marked in column of thickness of conductor in inner layer of the eighth comparative example indicates a sum of power source layers of core substrate.

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Fig. 31

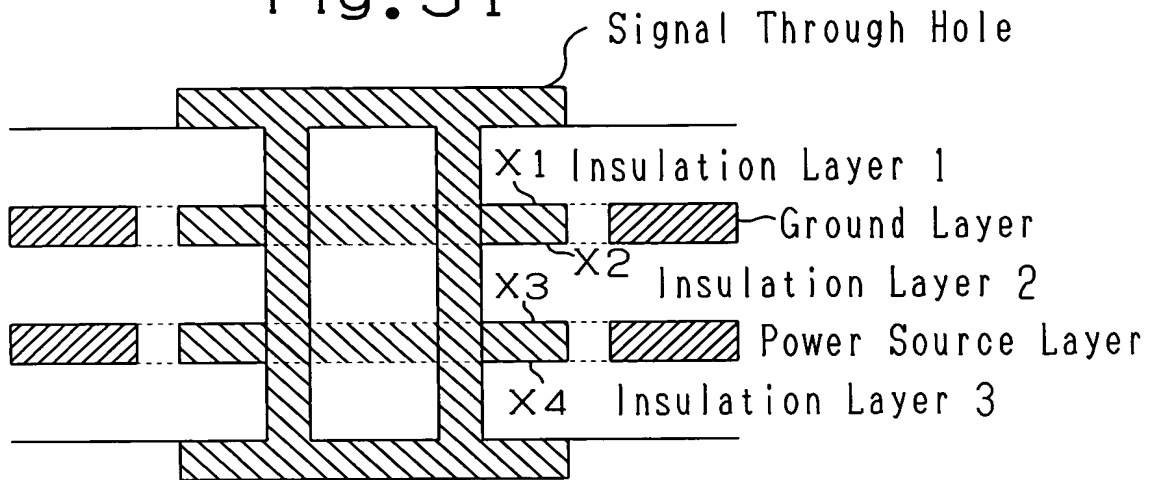


Fig. 32

#	$\alpha 1 /$ $\alpha 2$	Quantity Of Inner Layers	Thickness Of Conductive Layer On Interlayer Insulation Layer (μm)	Thickness Of Power Source Layer On The Front Surface Of Core Substrate (μm)	Thickness Of Power Source Layer In Inner Layer Of Core Substrate (μm)	Sum Of Thicknesses Of Power Source Layers Of Core (μm)	Amount Of Voltage Drop (V)	Result After HAST Test
Ninth Embodiment — 1	2	2	20	15	25	40	0.091	O
Ninth Embodiment — 2	1.2	2	20	9	15	24	0.093	O
Ninth Embodiment — 3	3	2	20	15	45	60	0.085	O
Ninth Embodiment — 4	3.75	2	20	15	60	75	0.085	O
Ninth Embodiment — 5	30.75	12	20	15	100	615	0.095	O
Ninth Embodiment — 6	40.75	16	20	15	100	815	0.097	O
Ninth Embodiment — 7	3	2	20	45	15	60	0.087	O
Ninth Embodiment — 8	3.75	2	20	60	15	75	0.086	O
Ninth Embodiment — 9	3.25	2	20	15	50	65	0.084	O
Ninth Embodiment — 10	8.25	2	20	15	150	165	0.083	O
Ninth Embodiment — 11	9.5	2	20	15	175	190	0.09	x
Ninth Embodiment — 12	10.75	2	20	15	200	215	0.093	x
Ninth Embodiment — 28	7	2	20	15	125	140	0.084	O
Ninth Comparison Example — 1	1	2	20	10	10	20	0.108	O
Ninth Comparison Example — 2	42	16	20	40	100	840	0.103	O
Ninth Comparison Example — 3	50.75	20	20	15	100	1015	0.123	O

Fig. 33

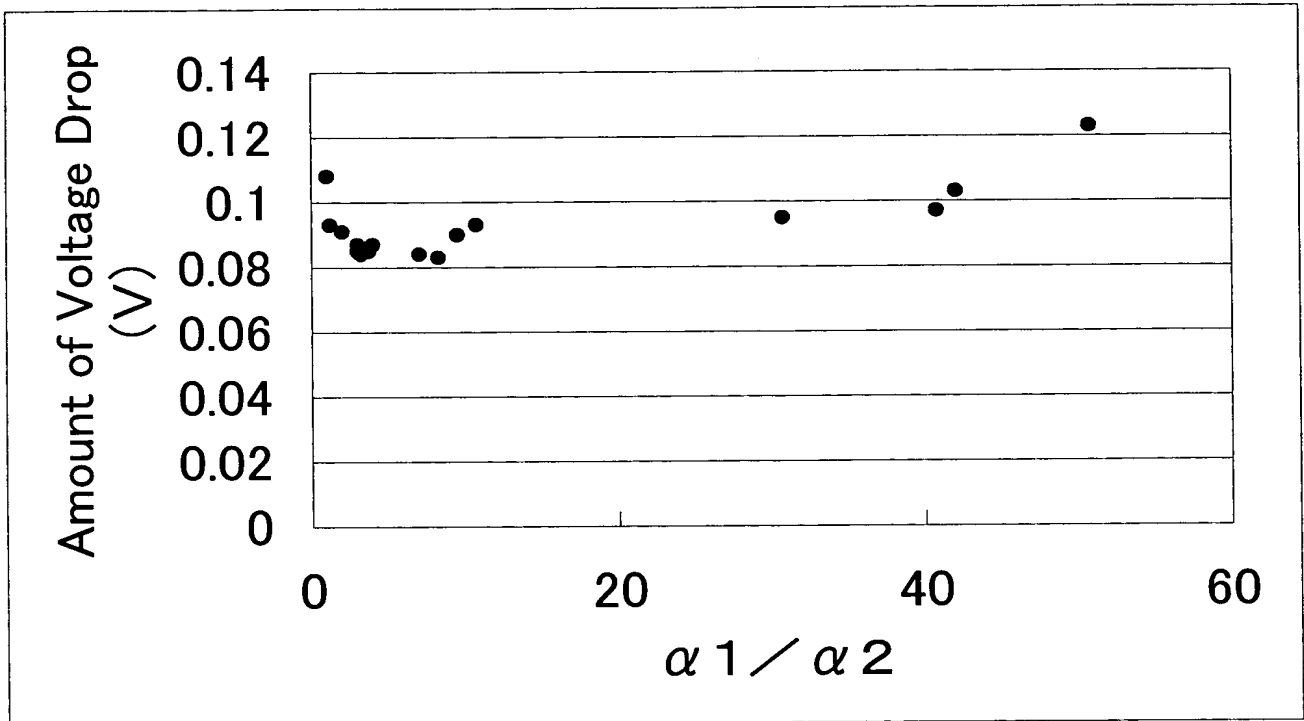
#	$\alpha 1 / \alpha 2$	Quantity Of Inner Layers	Thickness Of Conductive Layer On Interlayer Insulation Layer (μm)	Thickness Of Power Source Layer On The Front Surface Of Core Substrate (μm)	Thickness Of Power Source Layer In Inner Layer Of Core Substrate (μm)	Sum Of Thicknesses Of Power Source Layers Of Core (μm)	Amount Of Voltage Drop (V)	Presence/Absence Of Malfunction		
								Mounting of No.1 IC	Mounting of No.2 IC	Mounting of No.3 IC
Ninth Embodiment—1	2	2	20	15	25	40	0.091	No	Yes	Yes
Ninth Embodiment—2	12	2	20	9	15	24	0.093	No	Yes	Yes
Ninth Embodiment—3	3	2	20	15	45	60	0.085	No	No	No
Ninth Embodiment—4	3.75	2	20	15	60	75	0.085	No	No	No
Ninth Embodiment—5	30.75	12	20	15	100	615	0.095	No	Yes	Yes
Ninth Embodiment—6	40.75	16	20	15	100	815	0.097	No	Yes	Yes
Ninth Embodiment—7	3	2	20	45	15	60	0.087	No	No	Yes
Ninth Embodiment—8	3.75	2	20	60	15	75	0.086	No	No	Yes
Ninth Embodiment—9	3.25	2	20	15	50	65	0.084	No	No	No
Ninth Embodiment—10	8.25	2	20	15	150	165	0.083	No	No	Yes
Ninth Embodiment—11	9.5	2	20	15	175	190	0.09	No	Yes	Yes
Ninth Embodiment—12	10.75	2	20	15	200	215	0.093	No	Yes	Yes
Ninth Embodiment—27	4	4	20	15	32.5	80	0.087	No	No	Yes
Ninth Embodiment—28	7	2	20	15	125	140	0.084	No	No	No
Ninth Comparison Example—1	1	2	20	10	10	20	0.108	Yes	Yes	Yes
Ninth Comparison Example—2	42	16	20	40	100	840	0.103	Yes	Yes	Yes
Ninth Comparison Example—3	50.75	20	20	15	100	1015	0.123	Yes	Yes	Yes

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Fig. 34

#	Conductor Width/Interval Between Conductors (μm)				
	5/5	7.5/7.5	10/10	12.5/12.5	15/15
Ninth Embodiment-3	○	○	○	○	○
Ninth Embodiment-4	○	○	○	○	○
Ninth Embodiment-7	×	×	○	○	○
Ninth Embodiment-8	×	×	○	○	○

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Fig. 35



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Fig. 36

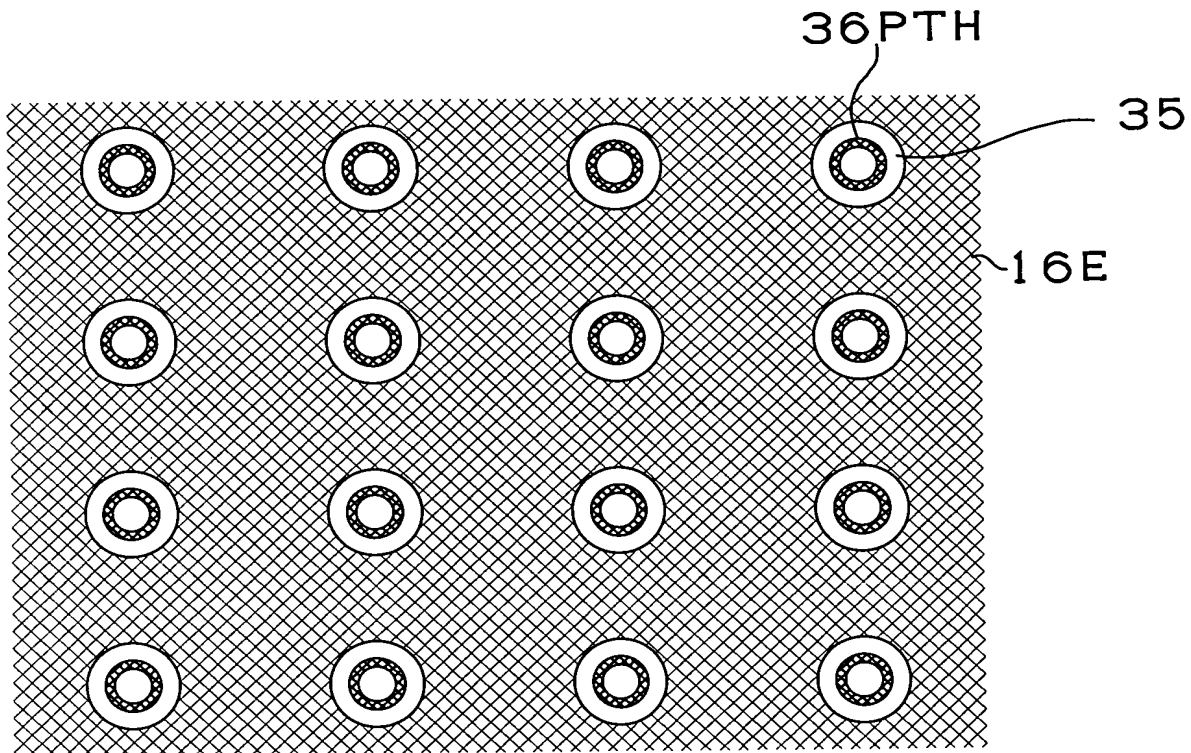
#	$\alpha 1$ / $\alpha 2$	No dummy land TH%	Quantity Of Inner Layers	Thickness Of Conductive Layer On Interlayer Insulation Layer (μm)	Thickness Of Power Source Layer On The Front Surface Of Core Substrate (μm)	Thickness Of Power Source Layer in Inner Layer Of Core Substrate (μm)	Sum Of Thicknesses Of Power Source Layers Of Core (μm)	Presence/Absence Of Malfunction		
								Mounting of No.1 IC	Mounting of No.2 IC	Mounting of No.3 IC
Ninth Embodiment—13	3	50	2	20	15	45	60	No	No	No
Ninth Embodiment—14	3	100	2	20	15	45	60	No	No	No
Ninth Embodiment—15	3.25	50	2	20	15	50	65	No	No	No
Ninth Embodiment—16	3.25	100	2	20	15	50	65	No	No	No
Ninth Embodiment—17	3.75	50	2	20	15	60	75	No	No	No
Ninth Embodiment—18	3.75	100	2	20	15	60	75	No	No	No
Ninth Embodiment—19	8.25	50	2	20	15	150	165	No	No	No
Ninth Embodiment—20	8.25	100	2	20	15	150	165	No	No	No
Ninth Embodiment—21	9.5	50	2	20	15	175	190	No	No	Yes
Ninth Embodiment—22	9.5	100	2	20	15	175	190	No	No	Yes
Ninth Embodiment—23	10.75	50	2	20	15	200	215	No	No	Yes
Ninth Embodiment—24	10.75	100	2	20	15	200	215	No	No	Yes
Ninth Embodiment—25	3	50	2	20	45	15	60	No	No	Yes
Ninth Embodiment—26	3	100	2	20	45	15	60	No	No	Yes

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Fig. 37

Embodiment	Thickness Of Conductive Layer In Inner Layer	Shape Of Taper	$\tan \theta$	no-dummy land TH%	Presence/Absence Of Malfunction
					No.4
Tenth Embodiment-1	45	Rounded Face	3.1~5.4	50	No
Tenth Embodiment-2	60	Rounded Face	3.1~5.4	50	No
Tenth Embodiment-3	100	Rounded Face	2.7~5.5	50	No
Tenth Embodiment-4	125	Rounded Face	2.7~5.7	50	No
Tenth Embodiment-5	150	Rounded Face	2.9~5.7	50	No
Tenth Embodiment-6	45	Rounded Face	3.1~5.4	100	No
Tenth Embodiment-7	60	Rounded Face	3.1~5.4	100	No
Tenth Embodiment-8	100	Rounded Face	2.7~5.5	100	No
Tenth Embodiment-9	125	Rounded Face	2.7~5.7	100	No
Tenth Embodiment-10	150	Rounded Face	2.9~5.7	100	No
Tenth Embodiment-11	45	Rounded Face	4.0~11.0	50	No
Tenth Embodiment-12	60	Rounded Face	3.8~11.0	50	No
Tenth Embodiment-13	100	Rounded Face	3.7~11.2	50	No
Tenth Embodiment-14	125	Rounded Face	3.7~11.4	50	No
Tenth Embodiment-15	150	Rounded Face	3.7~11.3	50	No
Tenth Embodiment-16	45	Rounded Face	4.0~11.0	100	No
Tenth Embodiment-17	60	Rounded Face	3.8~11.0	100	No
Tenth Embodiment-18	100	Rounded Face	3.7~11.2	100	No
Tenth Embodiment-19	125	Rounded Face	3.7~11.4	100	No
Tenth Embodiment-20	150	Rounded Face	3.7~11.3	100	No

Fig. 38

(A)



(B)

